REMARKS:

1) The Examiner's attention is directed to applicant's third Information Disclosure Statement being filed together with the present Response. Please consider the references, and return an initialed, signed and dated acknowledgment copy of the IDS Form PTO-1449 of October 5, 2005.

2) A Cross-Reference to two related applications (10/868,175 and 11/021,723) has been added to page 1 of the specification.

3) The claims have been amended by canceling prior claims 1 to 28 and instead introducing new claims 29 to 57. New independent claim 29 is based on original claim 1 with some editorial and substantive revisions. Some features based on original claims 2 and 28 have been included in new independent claim 29. The improved drive system of claim 29 includes first and second high-lift device groups and first and second drive stations respectively allocated to the first and second high-lift device groups. The two high-lift device groups are driven individually and independently of one another, respectively by the two drive stations, so that the two high-lift device groups are selectively drivable synchronously and asynchronously relative to one another. These features are further supported in the original specification (see e.g. page 6 line 20, page 8 lines 18 to 22, page 9 lines 9 to 21, page 24 lines 21 to 27, page 25 lines 9 to 12, page 27 lines 4 to 8, etc.), and thus do not introduce any new matter. New claims 30 to 49 and 51 to 56 are based on

original claims 2 to 27 in sequence. New claim 50 recites a feature of original claim 1. New claim 57 merely makes clear that all of the high-lift devices of the first group and of the second group in particular embodiments may all be trailing-edge flaps, or alternatively may all be slats, or alternatively may all be leading-edge flaps. These are merely alternative sub-sets of possible combinations under the independent claim. Entry and consideration of the new claims 29 to 57 are respectfully requested.

4) Before particularly addressing the prior art rejections and comparing the claimed inventive features to the prior art disclosures, the invention will first be discussed in general terms to provide a background.

The invention is generally directed to an improved flap or slat drive system of an aircraft, having two important features. One feature involves the provision of redundant drives for each group of high-lift devices, for improved safety and operating reliability in the event of a failure of one of the drives. It seems that the rejections have focused on this redundancy feature, but have not addressed the more important second feature of the invention as follows.

The more important second feature of the invention is that two groups of high-lift devices are driven **individually and independently** of one another by two drive stations that are respectively allocated to the two high-lift device groups. Thereby, the two high-lift device groups are selectively drivable **synchronously and asynchronously** relative to one another. This

feature of the invention has not been addressed in the rejections, and is neither disclosed nor suggested by the prior art.

Prior art flap or slat drive systems generally drive all of the high-lift device groups synchronously with one another through shaft lines from one or two drive units. Because the drive power for respective high-lift device groups was derived from the same drive shaft or drive line, and ultimately from one or two drive units, it is conventionally not possible to drive two respective high-lift device groups **individually and independently** of one another, particularly so that the two high-lift device groups are selectively drivable synchronously and **asynchronously** relative to one another. To the contrary, prior art flap or slat drive systems generally have driven respective high-lift device groups in a positively enforced synchronous manner, especially through a mechanical coupling or interconnection among the high-lift device groups.

In contrast to the prior art, the present invention does **NOT** involve a positive enforced coupling and synchronization between two high-lift device groups. Instead, the invention provides two separate drive stations respectively allocated to the two high-lift device groups and each one of the drive stations respectively includes two drives and two drive transmissions. Thus, each high-lift device groups has its own drive station, and each drive station includes two drives and two drive transmissions for redundancy within this drive station of an individual high-lift device group. The separate drive stations of the separate high-lift device groups can be

individually and independently controlled and actuated, to thereby drive the high-lift device groups individually and independently of one another. Thereby also, the two high-lift device groups are selectively drivable synchronously and asynchronously relative to one another as desired or required for any particular situation. The prior art provided no means or suggestions toward achieving such selective asynchronous driving of separate high-lift device groups.

The above discussion relates to independence and asynchronism of two high-lift device groups relative to one another. On the other hand, that must be distinguished from the operation of the two drives within the drive station allocated to a given one of the high-lift device groups. Namely, within the drive station of a given high-lift device group, there is synchronism (either electrical, electronic or mechanical) between the two drives so as to achieve smooth parallel actuation and avoid skewing of any given flap or slat. In other words, the two drives driving a given flap or slat must operate synchronously so that the flap or slat is actuated without skewing (e.g. about a vertical axis), which could lead to jamming and other problems. Thus, while the invention provides an independent and selectively asynchronous drive between two high-lift device groups, the invention also maintains "internal synchronism" between the two drives of a single drive station for a single high-lift device group.

The above features of the general prior art and of the invention are discussed further in the present specification. Regarding the enforced positive synchronization and lack of

independence among the drive arrangements for several high-lift device groups in the prior art, see page 4 lines 8 to 25 and page 5 lines 5 to 7. Regarding the inventive feature that the two high-lift device groups are driven individually and independently of one another so that they are selectively drivable synchronously and asynchronously relative to one another, see page 6 lines 19 to 21, page 8 lines 18 to 22, page 9 lines 9 to 21, page 11 lines 15 to 20, page 24 lines 21 to 27, page 25 lines 9 to 14, page 26 lines 5 to 9 and 17 to 21, page 27 lines 4 to 8, etc. Regarding the inventive feature of a synchronism between the two drives of a given drive station allocated to a given high-lift device group, see page 7 lines 1 to 14, page 10 lines 1 to 10, page 12 lines 14 to 22, page 16 lines 1 to 10, page 24 lines 18 to 21, and page 26 lines 1 to 16.

The following discussion will address the prior art rejections and compare the reference disclosures to the claimed features of the invention, further in view of the above general discussion.

5) The rejection of claims 1, 2, 6 to 18, 21 to 25, 27 and 28 as anticipated by U.S. Patent 4,892,274 (Pohl et al.) is respectfully traversed. In view of the cancellation of the original claims, this rejection will be discussed in connection with the new claims 29, 30, 34 to 46, 49 to 54 and 56.

6) Referring to the above general discussion, new independent claim 29 expressly recites several significant distinguishing features of the present invention:

a) the flap or slat drive system comprises two high-lift device groups of high-lift devices such as flaps or slats;

b) the drive system further comprises **two drive stations** respectively individually allocated to the two high-lift device groups;

c) each one of the two drive stations includes two drives and two drive transmissions connected to the high-lift device(s) of the respective group;

d) the two high-lift device groups are driven **individually** and **independently** of one another by the two drive stations; and

e) the two high-lift device groups are selectively drivable **synchronously** and **asynchronously** relative to one another.

7) Contrary to the present claim 29, Pohl et al. does not disclose and would not have suggested the combination of features a) to e) mentioned above.

While Pohl et al. disclose two drives (52 and 53) with two transmissions and connecting shafts, as pointed out by the Examiner, those two drives (52, 53) are connected through the shaft system to both flap groups (2, 3). Pohl et al. do not disclose "first and second drive stations respectively individually allocated to said first and second high-lift device groups", wherein each one of these drive stations "respectively includes two drives . . . and two drive transmissions" connected to the high-lift device of the respective allocated high-lift device group.

Furthermore, Pohl et al. do not disclose or suggest that two high-lift device groups shall be driven **individually** and

independently of one another by two drive stations respectively allocated to the two high-lift device groups. Pohl et al. do disclose a partially or pseudo-independent drive concept, but that relates to the drive power applied to a single flap, namely applying different actuator speeds to the two ends of a given single flap, in order to purposely cause a skewed extension of the flap by pivoting it slightly about a vertical axis as it is also extended outwardly from the trailing edge of the wing (see abstract; col. 3 lines 45 to 52; col. 4 lines 1 to 23 and 63 to 67; col. 5 lines 34 to 68; col. 7 line 21 to col. 8 line 3; etc.). The partial or pseudo-independence relates only to the different drive speeds of the spindle drives, but the actuation thereof is not independent from each other (see col. 5 lines 52 to 65).

Such a skewing of a single individual flap is actually contrary to the synchronism between the two drives of a single drive station for a single high-lift device group according to the invention (e.g. see present claims 32 to 34).

Also, even considering the suggestions of Pohl et al. regarding a partially or pseudo-independent drive (through a differential transmission) from a single drive source, or even from two redundant parallel drive sources, there still would have been no suggestion toward the present inventive provision of two separate drive stations for the two separate high-lift device groups, whereby each one of the drive stations has two drives and two drive transmissions.

8) The dependent claims recite additional features that further distinguish the invention over the prior art, for example as follows.

Regarding claim 35 (based on prior claim 7), Pohl et al. do not disclose two drive stations individually allocated to two high-lift device groups, whereby a respective group includes only a single flap or slat, and the drive station includes two drives and two drive transmissions that are mechanically connected to the single flap or slat. According to Pohl et al., there is only one drive source or two redundant sources connected through drive shafts, transmissions and the like to a given flap group, but if there are redundant drive sources they are shared among plural flap groups.

Claims 36 to 39 (based on prior claims 8 to 11) relate to an arrangement in which a drive transmission directly connects a respective drive to a given flap or slat, and additionally a guide transmission is connected via a drive shaft between the drive and the given flap. Pohl et al. do not disclose such an arrangement, but rather derive all power for all of the flap groups from external drive sources via shaft lines. There is no direct drive transmission between a drive and a flap, distinguished from a guide transmission connected via a drive shaft between the drive source and a flap.

Regarding claim 46 (based on prior claim 18), it is unclear what components or elements the Examiner considers to be a central control unit and plural decentralized control units in the arrangement of Pohl et al.

Claim 52 (based on original claim 23) recites that the two high-lift device groups are not mechanically or hydraulically interconnected with one another. Contrary thereto, Pohl et al. disclose a shaft-interconnection among plural flap groups.

Contrary to present claim 56 (based on original claim 27), the arrangements of Pohl et al. include angled shaft lines having angles, bends or kinks.

9) For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1, 2, 6 to 18, 21 to 25, 27 and 28 as anticipated by Pohl et al., because this rejection is not applicable against any of the new claims.

10) The rejection of claims 1, 3 to 5, 14 to 17, 23 to 26 and 28 as anticipated by U.S. Patent 4,575,027 (Cronin) is respectfully traversed. This rejection will be discussed in connection with the new claims 29, 31 to 33, 42 to 45 and 52 to 55.

11) Several important distinguishing features of new independent claim 29 have been discussed above. Cronin does not disclose and would not have suggested such a combination of features in a flap or slat drive system.

The present invention expressly relates to a flap or slat drive system including two groups of high-lift devices selected from slats, leading-edge flaps, and trailing-edge flaps. It is important to note that such high-lift devices are not the primary control surfaces (e.g. ailerons, elevators, rudder) of the aircraft, but rather are supplemental devices that enhance the

lift, for example for landing. It is also important to note that such high-lift devices on modern commercial passenger transport aircraft are not simply pivoted about a pivot hinge to a leading-edge or trailing-edge of the wing, but rather are connected to the wing by a track-guided linkage. Thus, a typical high-lift device does not simply pivot, but rather carries out a sliding motion or a simultaneous sliding and pivoting motion as it is extended or retracted relative to the wing.

In comparison to the present invention, the disclosure of Cronin relates to actuators for the primary control surfaces of the aircraft, such as the ailerons (see abstract, col. 2 lines 38 to 40, etc.). Cronin also specifically points out that the pertinent control surface is "rotatably mounted to a portion of said aircraft structure" (col. 6 lines 33 to 34). Other aspects of the disclosure also make clear that a pivotal motion of the primary control surfaces is intended (see col. 5 lines 58 to 65). These disclosures would have clearly indicated to a person of ordinary skill, that Cronin is proposing an actuator system for the primary control surfaces such as ailerons and elevators, rather than a drive system for high-lift devices such as flaps and slats.

More importantly, Cronin does not disclose and would not have suggested the provision of two high-lift device groups, as well as two drive stations individually allocated to the two high-lift device groups, whereby each drive station includes two drives and two drive transmissions, such that the two high-lift device groups are driven individually and independently of one another particularly so that the two high-lift device groups are

selectively drivable synchronously and asynchronously relative to one another. In fact, Cronin provides no suggestions whatsoever regarding a mutually coupled versus independent, or synchronous versus asynchronous drive of separate groups of high-lift devices such as flaps or slats. From the disclosure of Cronin, a person of ordinary skill would not have learned whether it is desirable to drive flaps or slats independently or mutually coupled with one another, or in a synchronous or asynchronous manner.

The main goal of Cronin is to provide a construction of an electromechanical actuator (EMA) such that a jammed EMA can be bypassed to allow further operation of a second redundant actuator (col. 2 lines 18 to 23 and col. 4 lines 33 to 42). While Cronin thus provides two (redundant) actuators connected in parallel with each other to a single primary control surface (col. 3 lines 24 to 26), it is clear that the two actuators must thus be driven synchronously with each other, because they are both mechanically connected to the same control surface (e.g. see Fig. 6). There would have been no suggestion toward enabling an asynchronous drive of high-lift devices of two high-lift device groups.

12) For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1, 3 to 5, 14 to 17, 23 to 26 and 28 as anticipated by Cronin, because this rejection is not applicable against any of the new claims.

13) The rejection of claim 1 as anticipated by U.S. Patent 6,755,375 (Trikha) is respectfully traversed. This rejection will be discussed in connection with new independent claim 29, which includes features from prior claims 1 and 28. It is noted that claim 28 was not rejected based on Trikha.

Trikha discloses an arrangement for driving aircraft devices such as leading-edge flaps or slats (131) or trailing-edge devices such as ailerons (132) (col. 3 lines 13 to 15). Trikha provides at least two redundant actuators allocated and connected to a single one of the aircraft control devices, whereby the two actuators are powered by different energy sources, e.g. one electrical actuator and one hydraulic actuator. This type of redundancy aims to achieve improved safety and operational reliability, and reduced weight and size (see abstract; col. 4 line 11 to col. 5 line 59; etc.).

However, there is no disclosure or suggestion that two separate groups of high-lift devices shall be driven individually and independently of one another by two individual drive stations respectively allocated to these high-lift device groups, such that the high-lift device groups are selectively drivable synchronously and asynchronously relative to one another. To the contrary, Trikha points out that the plural actuators are actuated simultaneously and apparently also always synchronously with one another (col. 4 lines 20 to 21 and 26).

There is no suggestion that distinct groups of flaps or slats shall be driven individually and independently, and in fact to be selectively drivable synchronously and asynchronously. That is a different upper level control concept, which is not

even addressed by Trikha. The mere redundancy and parallel provision of two actuators connected to a given aircraft control surface would have said nothing about the different control concept according to the invention.

For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claim 1 as anticipated by Trikha, because this rejection is not applicable against any of the present new claims.

14) The additional prior art made of record requires no particular comments, because it has not been applied against the claims.

15) Favorable reconsideration and allowance of the application, including all present claims 29 to 57, are respectfully requested.

Respectfully submitted,
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Applicant

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Enclosures:
IDS
Form PTO-1449
Form PTO-2038

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